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Source: Willdenowia, 35(1) : 97-105

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: https://doi.org/10.3372/wi.35.35107

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GERALD PAROLLY & BIRGIT NORDT

A further new *Peucedanum* species *(Apiaceae)* from the Taurus Mts, Turkey

Abstract

Parolly, G. & Nordt, B.: A further new *Peucedanum* species *(Apiaceae)* from the Taurus Mts, Turkey. – Willdenowia 35: 97-105. – ISSN 0511-9618; © 2005 BGBM Berlin-Dahlem.
doi:10.3372/wi.35.35107 (available via http://dx.doi.org/)

Peucedanum longibracteolatum from the vilayets Antalya and İçel in the western Central Taurus, S Anatolia is described and illustrated, including anatomical details. The tall species is named after one of its diagnostic characters, the persistent, up to 30 mm long, subulate-filiform bracteoles.

Introduction

The story of discovery of the species described here as new to science parallels in many respects that of *Peucedanum isauricum* Parolly & Nordt, which was also studied and collected by the pharmacist Robert Ulrich, Tübingen, Germany, over four subsequent years in the Central Taurus, Turkey (Parolly & Nordt 2004). Having an intimate knowledge of the flora of the montane elevations of the southern Anatolian Taurus Mts, Ulrich observed from summer 2000 on a more than 2 m tall umbellifer with persistent, up to 30 mm long, subulate-filiform bracteoles that could not be identified because it was not described in the "Flora of Turkey" (Chamberlain 1972) or its two supplements (Davis & al. 1988, Güner & al. 2000). The first specimens were distributed to the herbaria MSB and STU. Later thorough research has confirmed its novelty. Our carpological study suggests to ascribe it to the genus *Peucedanum* L., although there is no closely allied species that corroborates such a classification. The new species brings the number of Anatolian taxa of *Peucedanum* sensu amplissimo to a total of 17, including seven endemics (Chamberlain 1972, Parolly & Nordt 2004, Pimenov & Leonov 2004).

Colour indications accord with the terminology of Kornerup & Wanscher (1981). Chromosome numbers were obtained from somatic mitoses of root tips of plants raised from *Ulrich 1/131*. The cytological standard techniques used follow Vogt & Oberprieler (1993).

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Peucedanum longibracteolatum Parolly & Nordt, **sp. nov.** – Fig. 1-3
Holotype: Türkei [Turkey], C4 Antalya, Alanya, Mahmutlar - Taşkent, etwa 50 km NE Mahmutlar, Tal des Gökdere Çayı nahe Çayarası, 1130 m, Steilhang, Exp. S, 1.7.2003, *Ulrich 3/30* (B; isotype: herb. Parolly).

Species valde insignis ab omnibus speciebus europaeis et orientalibus combinatione characteribus (1) caule elato usque ad 2.5 m alto sed tenui, (2) collo radicis non fibroso-comoso, (3) foliis subcoriaceis, (4) radiis et pedicellis inaequalibus, (5) bracteolis persistentibus inaequalibus, 3 majoribus radiantibus subulatis usque setaceis 15-30 mm longis, (6) petalis purpureis et (7) stylopodio depresso bene distincta.

Erect, glaucous, completely glabrous, one-stemmed, short-lived, possibly monocarpic perennial or biennial(?), 180-250 cm tall. *Rootstock* woody, 10-15 mm in diam., weakly branched, oblique, with a short, non-fibrous collar up to 25 mm. *Stems* fairly slender, 8-9 mm in diam. at base, terete, solid, with distinct white medulla, striolate, greyish green, branching in a 30-35° angle, already from near the base. *Leaves* greyish green to glaucous, subcoriaceous, with prominent veins, flat except for the weakly enrolled margin, mostly basal, soon withering and lacking after anthesis. *Basal leaves* 5-8, lamina oblong to oblong-ovate in outline, 15-40 × 3-15 cm, 1(-2)-pinnate, petioles 6-18 cm long, canaliculate, sheaths 1-3 cm long; segments deltoid to ovate, 2.5-8 × (1-)2-6 cm, triternate, deeply incised to subpinnatifid, narrowed into a 0.3-2.5 cm long petiolule or subsessile with a cuneate base; terminal segments equalling the lateral segments in size; ultimate segments (or leaf lobes) oblong, oblong-ovate to narrowly ovate, cuneate at base, apex rounded, hyaline-mucronulate. *Cauline leaves* few, becoming upwards increasingly smaller and simpler, reduced, pinnatifid, 2-3 cm long, segments narrowly lanceolate, 1-2.5 × 0.2-0.3 cm, apex acute, often extended into a hyaline awn, those supporting inflorescence branches often with a broad hyaline margin in lower parts (sheath, rhachis). *Synflorescence* composed of long-pedunculate compound umbels, unequally 5-9-rayed, rays 0.5-4 cm long, stout, flattened to rounded rectangular in transverse section (c. 1 × 0.3-0.4 mm), striate, waxy-glaucous. *Bracts* 0. *Flowers* small, 2.5-3.5 mm in diam., all perfect, pedicellate, (6-)8-9(-10) in each umbellule. *Bracteoles* normally 5, very unequal in length (2 of them inconspicuous, 3 extraordinarily long), persistent, spreading-erect, glaucous, flushed purple with age, subulate to filiform, the 2 smaller ones 1-5 mm long, the 3 longer ones radiate, on long-rayed umbels extending 15-30 mm. *Pedicels* fairly stout, rounded quadrangular, 0.4-0.5 mm in diam., unequal, (2-)3-6(-7) mm long. *Sepals* obsolete. *Petals* outside with a greenish base, in all other parts purplish with darker margin and oil-duct, ovate to obovate, thick, inflexed, shallowly emarginate, with hyaline, truncate retuse tip, 2 × 1.5 mm. *Stamens* enrolled; filaments pale brownish to yellowish, c. 1.5 mm long; anthers yellowish to yellow, subglobular, 0.6-0.8 mm, dorsally inserted. *Stylopodium* flattened, with undulate margin, yellow or purplish, glabrous. *Style* c. 1 mm, slender, deflexed, purple, stigma capitate, brownish. *Ovary* urn-shaped, c. 2 × 1.3-1.5 mm, yellowish green to green (unless pedicels without glaucous hue and wax surface). *Fruit* straw-coloured or different shades of purple except ribs and wings, ovoid to nearly circular, flattened. *Mericarps* (4.5-)5-6 × (4-)5-5.6 mm, with narrow but distinct spongiose wings c. 0.7 mm wide, 5-ribbed; oil-ducts (in transverse section) prominent, not associated to vascular bundles, 4 vallecular, 2 commissural, extending to the base of the mericarps. Chromosome number: $2n = 22$.

Etymologie. – The name refers to one of its main diagnostic and most striking characters, the persistent, to 30 mm long, subulate-filiform bracteoles (Fig. 3a).

Additional specimens seen. – C4 ANTALYA: Type locality, 23.10.2001, *Ulrich 1/130-132* (STU [rootstock and fruiting synflorescences]), *Ulrich 1/140* (MSB, herb. Parolly [mericarps plus photographs]); ibid., 1060 m, steiler, felsiger Hang, Exp. SE, 14.6.2000, *Ulrich 0/57* (STU [inflorescence in bud, leaf fragment]); ibid., 1070 m, Steilhang (Kalk), Exp. S, 18.6.2001, *Ulrich 1/17-1/18* (STU [postfloral synflorescences and 1 leaf]); ibid., 8.9.2001, *Ulrich 1/19-1/20* (STU [postfloral synflorescences]), *Ulrich 1/138-1/139* (MSB [postfloral synflorescences]); ibid.,

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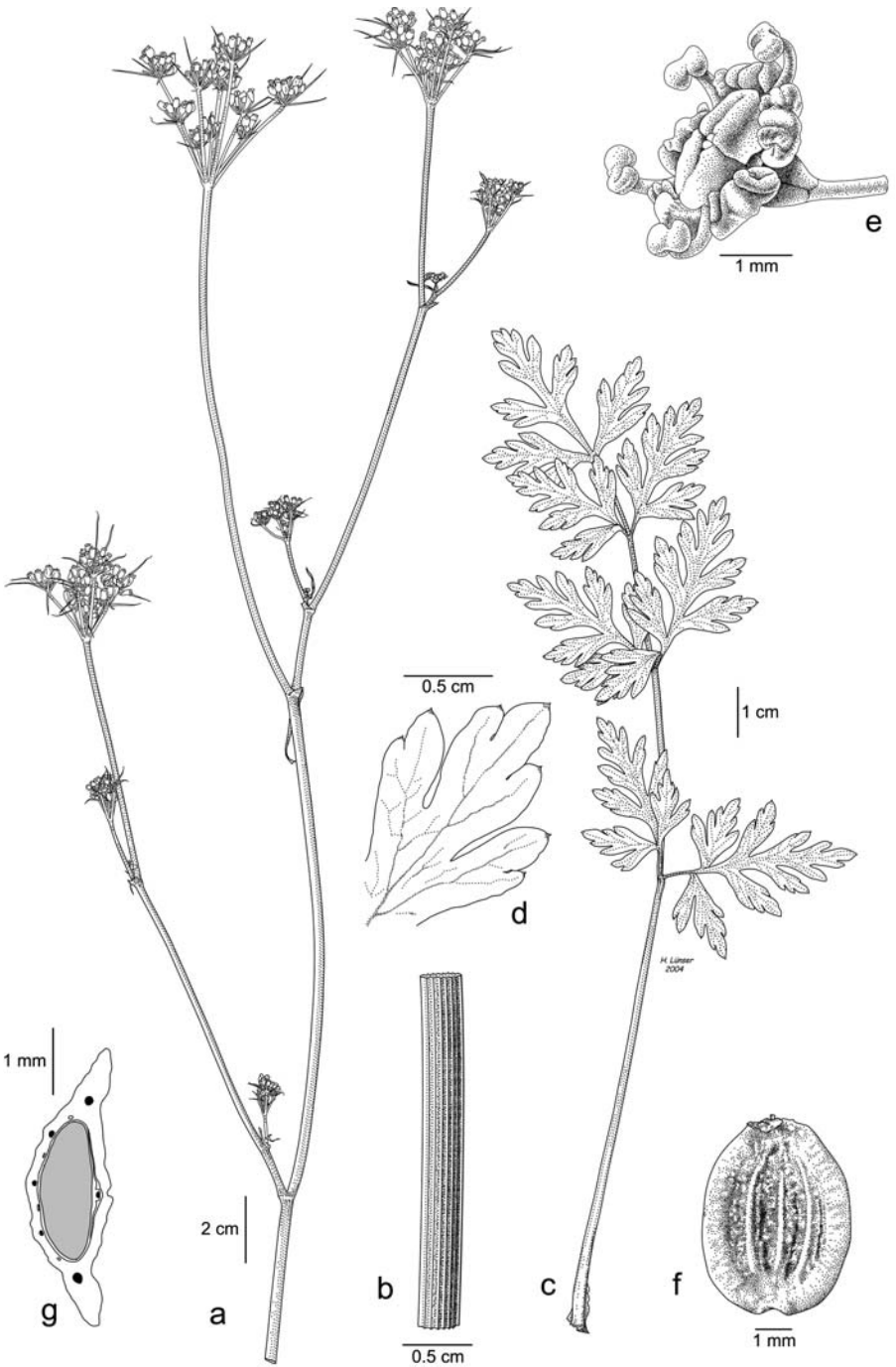


Fig. 1. *Peucedanum longibracteolatum* – a: habit, upper part of main axis, postfloral; b: portion of stem, median part; c: lower stem leaf; d: leaflet (to show venation and mucronulate leaf tips); e: flower, male stage; f: mericarp, dorsal view; g: transverse section of mericarp [white = vascular bundles, black = oil ducts, grey = endosperm]. – a, b after *Ulrich 1/17*, c-e after isotype, *Ulrich 3/30*, f-g after *Ulrich 1/140*.

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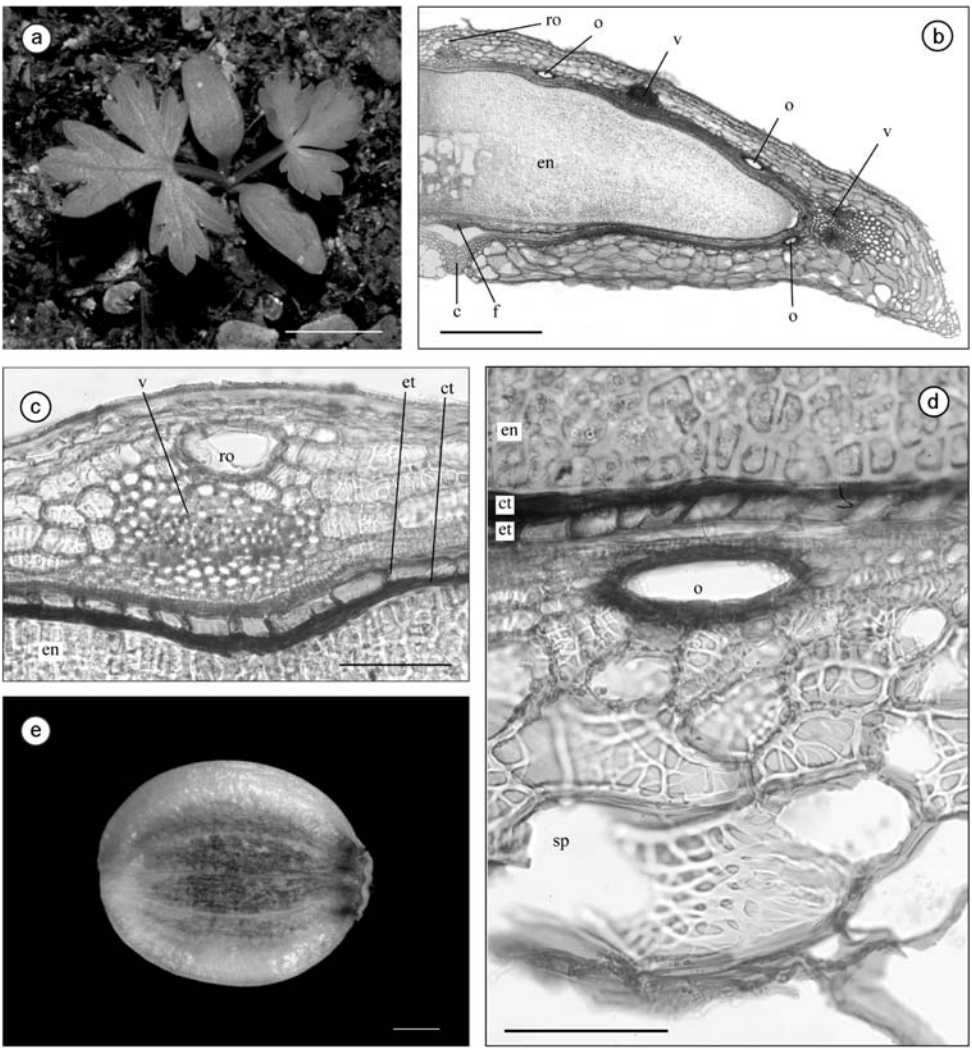


Fig. 2. *Peucedanum longibracteolatum* – a: seedling with cotyledons and primary leaves c. 3 weeks after germination; b-d: transverse sections of mericarps; b: overview (wing, arrangements of tissues, vascular bundles and oil ducts [note the spongiose tissue especially well developed on the ventral side of the mericarp and in the wing]; c: rudimentary oil duct associated to vascular bundle, epidermis of testa; d: oil duct, spongiose tissue on the ventral side with cells becoming outwards increasingly larger; e: SEM photograph of mericarp, dorsal view (note the undulate stylopodium margin). – Abbreviations: c = carpophor, ct = compressed tissue, en = endosperm, et = epidermis of testa, f = funicular vascular bundle, o = oil duct, ro = rudimentary oil duct, sp = spongiose tissue, t = testa, v = vascular bundle. – Scale bars: 1 cm (a), 0.5 mm (b), 0.1 mm (c-d) and 1 mm (e); material: *Ulrich 1/141*.

18.10.2002, *Ulrich 2/60* (herb. Parolly [postfloral synflorescences]), ibid., 1080 m, steiler, offener Kalkhang, Exp. S, 22.8.2004, *Ulrich 4/25a* (B, E, GAZI, herb. Parolly [flowering synflorescences]); ibid., 1030 m, Kalkhang mit *Abies cilicica*, Exp. N, *Ulrich 4/25b* (B, herb. Parolly [flowering synflorescences]); ibid., 1110 m, lichte Stellen im *Abies cilicica*-Wald, Exp. N, 23.10.2001, *Ulrich 1/141* (MSB, [fruiting synflorescences]); 54 km NE Mahmutlar,

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Fig. 3. *Peucedanum longibracteolatum,* photographs of herbarium material (*Ulrich 3/30* [holotype]) – a: compound umbel, flowering (note the extremely unequal rays and long extended bracteoles; b: rootstock with petiolar remains. – Scale bars: 0.5 cm (a), 1 cm (b).

1220 m, Steilhang, Exp. E, 25.10.2001, *Ulrich 1/142* (MSB [fruiting synflorescences]). – C4 İÇEL: Silifke-Kırobası, etwa 22 km N Silifke, 980 m, eingezäuntes, bebuschtes Gelände, 21.10. 2002, *Ulrich 2/61* (herb. Parolly [fruiting synflorescences]).

Phenology. – In early July, *Peucedanum longibracteolatum* is still in bud; flowering starts at the end of July or in early August. Ripe fruits are not present before mid October.

Distribution. – The present records characterise *Peucedanum longibracteolatum* as endemic to the Central Taurus Mts, where it grows in two areas within a fairly narrow altitudinal range between 950 and 1250 m. The two localities (Gökdere [Gevne] Çayı near Çayarası and Silifke-Kırobası) lie some 130 km apart. The occurrences in the Gökdere Çayı valley near Çayarası in the Alanya district are at two locations (50 and 54 km NE Mahmutlar) along the river, with partly deviating site conditions. The wider distribution area has proven in recent years to be one of the diversity centres in the Taurus Mts for vascular plants (e.g., Ekim 1999, Güner & al. 2000, Kilian & Parolly 2002).

Site conditions. – *Peucedanum longibracteolatum* appears to be associated with rocky montane conifer forests, developed over limestone and similar sediments partly covered by a moderately acidic litter. Mericarps grown on conventional garden mould with a subneutral to moderately acid pH value developed into healthy seedlings. *P. longibracteolatum* grows, in various exposures, preferably at sunny places. Observations at shady sites document fewer and weaker individuals (R. Ulrich in litt., 1.12.2003). The main occurrence of *P. longibracteolatum* along the Gökdere Çayı lies slightly N of Çayarası, where it grows splendidly, if not trampled down in its juvenile stage by cattle as in 2004. Here, at 1060-1130 m, it is concentrated on an extensive, steep and partly rocky, S exposed limestone slope with scattered *Pinus nigra* var. *caramanica* (Loudon) Rehder and *Quercus infectoria* subsp. *boissieri* (Reuter) O. Schwarz. Our species co-dominates

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the site together with *Cephalaria dipsacoides* Boiss. & Bal. and *Glaucosciadium cordifolium* (Boiss.) B. L. Burtt & P. H. Davis, while *Astragalus angustifolius* Lam. subsp. *angustifolius, Centaurea kotschyi* var. *decumbens* Wagenitz, *Pelargonium endlicherianum* Fenzl, *Phlomis monocephala* P. H. Davis, *Physospermum cornubiense* (L.) DC., *Saponaria kotschyi* Boiss. and *Sideritis condensata* Boiss. & Heldr. are less frequent. On the opposite, N exposed slope on the other side of the river, *P. longibracteolatum* occurs infrequently, together with *P. officinale* subsp. *longifolium* (Waldst. & Kit.) R. Frey in a tall *Abies cilicica* subsp. *isaurica* Coode & Cullen forest at 1100 m. Site conditions at the satellite locality four km to the north are similar, there a very steep and shady, N facing slope supporting at an elevation of 1160 m another Cilician fir forest with *Cephalaria gazipashensis* Sümbül, *Physospermum cornubiense* and, dominant, *Klasea grandifolia* (P. H. Davis) Greuter & Wagenitz. Due to the unfavourable light conditions, *P. longibracteolatum* remains extraordinarily rare in the understorey, but predominates on a clearing higher up (1220 m). At its lowest sites (960-980 m) between Silifke and Kırobası, it is abundant in low-statured, vast shrublands with *Styrax officinalis* L. in S and SW exposure, which appears to be a neglected *Pinus brutia* Ten. afforestation. Associated herbaceous species include *Asphodeline baytopae* E. Tuzlacı, *A. rigidifolia* (Boiss.) Baker, *Campanula macrostyla* Boiss. & Heldr., *Centaurea aggregata* DC., *C. antiochia* var. *praealta* (Boiss. & Bal.) Wagenitz, *Cephalaria dipsacoides, Eryngium isauricum* Contandr. & Quézel, *Ferulago asparagifolia* Boiss., *Himantoglossum affine* (Boiss.) Schltr., *Lathyrus cilicicus* Hayek & Siehe and *Michauxia campanuloides* Aiton.

Recommended IUCN threat category. – There are two fairly localised occurrences of *Peucedanum longibracteolatum,* each with abundant individuals. In addition, fruit set seems copious. On the other hand, partial serious damage by cattle was observed in the Gökdere Çayı valley. Twice R. Ulrich reported on ravage caused by cows trampling down most of the young plants and many plants just starting to flower. This and its narrow distribution range constitutes a certain risk of threat, suggesting the classification of *P. longibracteolatum* as "Vulnerable (VU)" according to criterion D of the IUCN Red List Categories (2001).

Relationship. – In our earlier contribution on Anatolian *Peucedanum* (Parolly & Nordt 2004), we summarised some of the taxonomic problems of *Peucedanum* s.l., today widely considered as an outraging complex group encompassing a coarse conglomerate of fairly distantly related elements (Downie & al. 2000, Frey 1989, Hadaček 1989, Pimenov 1987a-c, Pimenov & Leonov 1993, Pimenov & al. 2003, Reduron & al. 1997, Shneyer & al. 2003, Spalik & al. 2004). The whole group is presently under revision. Depending on the techniques used and the species included, the classifications in the studies cited above are too deviating for stabilising the concepts of satellite genera of *Peucedanum*. Therefore, many generic assignments, including ours, must be preliminary. The generic concepts in *Peucedanum* sensu amplissimo adopted here largely accord with Pimenov (1987a-c) and Pimenov & Leonov (1993); for details see Parolly & Nordt (2004).

Using the standard floras of the Mediterranean and Near East (Chamberlain 1972, Mouterde 1970, Pimenov 1987a-c, Rechinger 1987, Shishkin 1951, Tutin 1968, Zohary 1972) brings to light that *Peucedanum longibracteolatum* does not closely approach any known "true *Peucedanum*" or member of peucedanoid segregates such as *Cervaria* N. M. Wolf, *Holandrea* Reduron & al., *Imperatoria* L., *Oreoselinum* Hill, *Pteroselinum* (Rchb.) Rchb., *Thysselinum* Hill, *Tommasinia* Bertol. and *Xanthoselinum* Schur. The somatic chromosome number of $2n = 22$ obtained for *P. longibracteolatum* helps only to exclude a closer relationship to the core group of *P.* sect. *Peucedanum* around *P. officinale* L. with chromosome numbers of $2n = 66$ (Frey 1989, Pimenov & al. 2003). Beyond this, chromosome numbers can tell nothing about the generic assignment, since all segregates (and many other umbellifers) have $2n = 22$, as also at least part of the true *Peucedanum* species (Pimenov & al. 2003).

The main carpological characters (see below and Fig. 1) suggest its present inclusion in *Peucedanum* (s.l.). However, within this genus it stands apart with its unique combination of

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striking and unmistakable characteristics: a more than 2 m tall, but fairly slender, completely glabrous, strict perennial; a non-fibrous collar (Fig. 3b); subcoriaceous leaves; unequal rays and pedicels (Fig. 1a); persistent, unequal bracteoles, 3 of them radiate, spreading-erect and extended to filiform subulae (Fig. 3a); purple petals; flattened and broad stylopodium (Fig. 1g, 2e).

The only other *Peucedanum* with unusual bracteoles is the NW Anatolian *P. graminifolium* Boiss.; it has up to (5-)7-10 scarious-margined, linear-lanceolate, in young flowers 8-14(-20) mm long, finally deflexed bracteoles (Parolly & Nordt 2004; see also Chamberlain 1972, Frey 1989, Vural & Adıgüzel 1996). The latter species strongly deviates in its smaller stature, grass-like leaves with narrowly lanceolate segments up to 11.5 cm long, adaxially spiny-pubescent (versus glabrous) rays, more flowers per umbel (18-30), and, as in *Bornmüller 2210* (B), by a single broadly scarious-margined bract of 50 × 3 mm. The carpological similarity may well be due to homoplasy (see below).

The seedlings, too, contribute to the bewildering picture of the unsolved classification of *Peucedanum longibracteolatum* (but at least support the view not to deal with a member of the core group of *Peucedanum*): It has the broadly elliptic to oval cotyledons of the *Cervaria* or *Oreoselinum* type (Fig. 2a) and not of the *Peucedanum* s. str. type (linear; J.-P. Reduron in litt.).

Comparative carpology. – For carpological gross morphology and anatomy of *Peucedanum longibracteolatum* see the description above and Fig. 1f, g and 2b-e. The mericarps are fairly inconspicuously ribbed (Fig. 1g) to almost ribless (Fig. 2b, e), often with translucent oil ducts. Fig. 2b illustrates the arrangement of the tissues in transverse section. As in *P. isauricum,* the testa is ± completely obliterated except for the tissue surrounding the funicular bundle. Occasionally the epidermis persists (Fig. 2c-d). The pericarp consists of a spongiose parenchymatic tissue, typical of some *Peucedanum* s.l. (Parolly & Nordt 2004, Thellung 1926), but spongiose wings of flattened fruits may also suggest relationship with *Tordylieae* W. D. J. Koch or the *Heracleum* clade sensu Downie & al. 2000, including *Heracleum* L., *Malabaila* Hoffm., *Pastinaca* L., *Tetrataenium* (DC.) Manden., *Tordylium* L. and *Zosima*. The cells increase outwards in size (Fig. 2d). The innermost layers are sometimes compressed and closely attached to the seed coat. In contrast to *P. isauricum* and many other species (Hadaček 1989, Parolly & Nordt 2004, Thellung 1926), a sclerenchyma is completely lacking. All oil ducts are situated between the vascular bundles, i.e. 4 dorsal vallecular and 2 ventral commissural ducts in total. However, in some mericarps rudimentary oil ducts associated to the vascular bundles can be observed (Fig. 2c). The embryo is embedded in a well developed endosperm, displaying abundant protein bodies as reserve material. In overall appearance and especially concerning the distribution and size of oil ducts and vascular bundles, *P. graminifolium* is the closest match of our species (see Vural & Adıgüzel 1996). Since this character pattern is frequently developed in *Peucedanum* (e.g., *P. officinale* L. group) and its segregates, not too much stress should be laid on its taxonomic value (compare the sections in Arenas & García 1993, Hadaček 1989). This holds especially true, if rudimentary oil-ducts add to the variability.

Specimens of Peucedanum graminifolium seen. – TURKEY: A4 Kastamonu, Devrekani - Bozkurt, 1400 m, 20.9.1996, *Vural 7659, Adıgüzel & Ekici* (GAZI, herb. Parolly); A5 Samsun, Ak Dağı near Ladik, 1890 *Bornmüller, 2210* (B).

Acknowledgements

We cordially thank the pharmacist Mr Robert Ulrich (Tübingen, Germany) and his wife, Mrs Gertrud Ulrich, for providing us with specimens, their full field notes and photographs. Field botany in SW Asia owes much to such competent amateur botanists! During a short visit of the first author to GAZI, Prof. Dr Zeki Aytaç (Ankara) kindly presented him with a fruiting specimen of *Peucedanum graminifolium*. We also express our gratitude to Dr Norbert Kilian for his assistance with the Latin diagnosis. Grateful acknowledgement is made to Dr Franz Schuhwerk (M, handling the loan from MSB), Dr Arno Wörz (STU) and Dr Robert Vogt (B) for the loan of

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herbarium material. The care of Horst Lünser (Berlin) in preparing the line drawings and of Mrs Sandra Berger in checking the English is greatly appreciated.

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